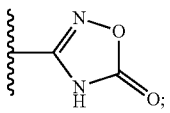
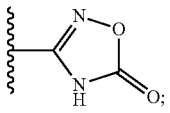
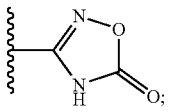
K is $C(O)NH_2$, COOH, SO_3H, OSO_3H, PO_3H_2, OPO_3H_2, NH_2, NHR_{19}, $NR_{19}R_{20}$, SO_2R_{21}, glycoside, lower C_1, C_2, C_3, C_4, C_5, C_6 alkoxy, or



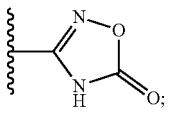
L is aryl, OH, $C(O)NH_2$, COOH, SO_3H, OSO_3H, PO_3H_2, OPO_3H_2, NH_2, NHR_{19}, $NR_{19}R_{20}$, SO_2R_{21}, glycoside, lower C_1, C_2, C_3, C_4, C_5, C_6 alkoxy, or



M is aryl, OH, $C(O)NH_2$, COOH, SO_3H, OSO_3H, PO_3H_2, OPO_3H_2, NH_2, NHR_{19}, $NR_{19}R_{20}$, SO_2R_{21}, glycoside, lower C_1, C_2, C_3, C_4, C_5, C_6 alkoxy, or



Q is aryl, OH, $C(O)NH_2$, COOH, SO_3H, OSO_3H, PO_3H_2, OPO_3H_2, NH_2, NHR_{19}, $NR_{19}R_{20}$, SO_2R_{21}, glycoside, lower C_1, C_2, C_3, C_4, C_5, C_6 alkoxy, or



R_{19}, R_{20} and R_{21} are independently C_1, C_2, C_3, C_4, C_5, or C_6 alkyl or R_{19} and R_{20} taken together with the attached nitrogen atom form a five membered ring;

V is a bond, —CH_2—, —CH_2CH_2—, —$CH_2CH_2CH_2$—, —O—CH_2—, —OCH_2CH_2— or —$OCH_2CH_2CH_2$—;

R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, Rn, and R_{18}, are, independently, H or C_1, C_2, C_3, C_4, C_5, or C_6 alkyl; and

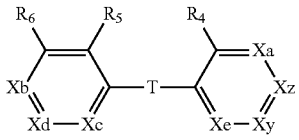
Z is $(CHR_1)_n$—C(O)—$NR_2(CHR_3)_m$—Ar, where Ar is a substituted or unsubstituted aryl or nitrogen-containing heteroaryl group, R_1, R_2, and R_3 are independently H or C_1, C_2, C_3, C_4, C_5, or C_6 alkyl; and

n and m are, independently 0, 1, or 2;

provided that at least one of R_a, R_b, R_c, R_d, R_e, R_4, R_5, and R_6 is P.

2. A method of protecting against or treating hearing loss or osteoporosis in a subject comprising administering a compound having the Formula I:

(Formula I)



or a salt, solvate, hydrate, or prodrug thereof, wherein:

T is absent, $CR_{12}R_{13}$, C(O), O, S, S(O), $S(O)_2$, NR_{14}, $C(R_{15}R_{16})C(R_{17}R_{18})$, CH_2O, or OCH_2;

X_y is CZ, CY, N, or N—O;

X_z is CZ, CY, N, or N—O;

at least one of X_y and X_z is CZ;

Y is selected from hydrogen, hydroxyl, halogen, lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl, C_1, C_2, C_3, C_4, C_5, or C_6 alkoxy, O-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl-aryl, and O-benzyl;

X_a is CR_a or N, or N—O;

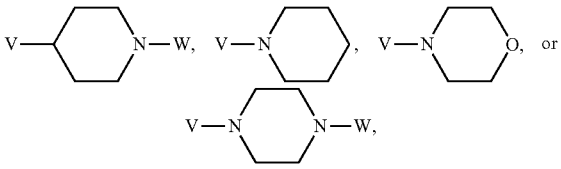
X_b is CR_b, N, or N—O;

X_c is CR_c or N, or N—O;

X_d is CR_d or N, or N—O;

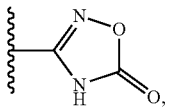
X_e is CR_e, N, or N—O;

R_a, R_b, R_c, R_d, R_e, R_4, R_5, and R_6 are, independently, hydrogen, hydroxyl, halogen, P, C_1, C_2, C_3, C_4, C_5, or C_6 alkyl, C_1, C_2, C_3, C_4, C_5, or C_6 alkoxy, O-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl-aryl, O-benzyl, C_1, C_2, C_3, C_4, C_5, or C_6 alkyl-OH, COOH, COO-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl, SO_2H, SO_2-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl,



where W is H, or C_1, C_2, C_3, C_4, C_5, or C_6 alkyl, C_1, C_2, C_3, C_4, C_5, or C_6 alkyl-aryl;

P is SO_3H, OSO_3H, OPO_3H_2, OPO_3H_2, NH_2, NHR_{19}, NHR_2OR_{21},



tetrazole, O-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl-K, O—C(O)-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl-L, NH-lower (C_1, C_2, C_3, C_4, C_5, or C_6) alkyl-M, or O-aryl-Q, further wherein lower alkyl is linear or branched alkyl;

K is $C(O)NH_2$, COOH, SO_3H, OSO_3H, PO_3H_2, OPO_3H_2, NH_2, NHR_{19}, $NR_{19}R_{20}$, SO_2R_{21}, glycoside, lower C_1, C_2, C_3, C_4, C_5, C_6 alkoxy, or